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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)
Panagiotis Anagnostopoulos	)
Serial No. 10/523,947	) Group:
Filed:	)
Title: METHOD OF CONSTRUCTION OF MATTRESSES FROM MASS PRODUCED AND SIMULTANEOUSLY POCKET ENCAPSULATED SPRINGS AND MATTRESS PRODUCED BY THIS METHOD	) Examiner:

SUBMISSION OF PRIORITY DOCUMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant hereby claims the priority of Greek Patent Application Serial No. 20020100377, filed August 12, 2002, under the provisions of 35 U.S.C. 119.

A certified copy of the priority document is enclosed herewith. Also enclosed is a verified translation of the priority document.

Respectfully submitted,

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CERTIFICATION OF MAILING

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Athens, 15 March 2005

We hereby confirm that the translation of the priority document for Patent under number 20020100377 is exact and correct.

CALINO S.A.

P. ANAGNOSTOPOULOS

C662

Vorlage	Ablage	C655
Haupttermin		
Eing.: 29.MRZ 2005		
PA. Dr. Peter Riebling		
Bearb.:	Vorgelegt:	

INDUSTRIAL PROPERTY ORGANIZATION

CERTIFICATE

We hereby certify that the documents accompanying this certificate are exact and true copies of the regular application for the granting of a Patent under number 20020100377 submitted to the Industrial Property Organization on 12/08/2002 by Mr. Anagnostopoulos Panagiotis resident in Akakion street No. 64 in Marousi.

Marousi,

On behalf of the Industrial Property Organization
The Managing Director
(signature)
Mr. Serafeim Stasinos
(official seal)

Address : Pantanassis 5, 15125 Paradisos Amarousiou
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APPLICATION FOR

INDUSTRIAL PROPERTY ORGANISATION

A PATENT
OR
A MODIFICATION CERTIFICATE (MC)
OR
A UTILITY MODEL CERTIFICATE (UMC)

Application Number:	20020100377	01
Received on:	12 AUGUST 2002	
Filed on:	12 AUGUST 2002	

This application requests:

X	A PATENT (P)	02
	A MODIFICATION CERTIFICATE (MC) FOR PATENT (state P. number):	
	A UTILITY MODEL CERTIFICATE (UMC)	

This application comprises part of application with number: 03

TITLE OF INVENTION: METHOD FOR THE CONSTRUCTION OF INNERSPRING UNITS FROM SPRINGS WHICH ARE MASSIVELY PRODUCED AND ENTRAPPED IN POCKETS WHERE EACH SPRING POSSESSES DIFFERENT STIFFNESS LEVELS. 04

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	MORE DEPOSITORS ON A SEPARATE SHEET	06

no.

INVENTOR 07

[X] The depositor(s) is (are) the only inventor(s).

[ ] A sheet specifying the inventor(s) is attached.

CLAIMS 08

Number of claims [12]

STATEMENT OF PRIORITY (number - date - country of origin) 09

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ATTORNEY 11

name:
address:

telephone: telex: telefax:

INTERNATIONAL EXHIBITION 12

[ ] This invention was presented at an official exhibition, as per law 5562/1932 Government Gazette (ΦΕΚ) 221A/32

[ ] Relevant certificate is attached

SIGNED BY THE INVETOR(S) or HIS/HER (THEIR) PROXY(IES) 13

Place: ATHENS Date: 12-08-2002

(SIGNATURE)

ANAGNOSTOPOULOS PANAGIOTIS

PLEASE TYPE YOUR NAME BELOW YOUR SIGNATURE.
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METHOD FOR THE CONSTRUCTION OF INNERSPRING UNITS FROM SPRINGS WHICH ARE MASSIVELY PRODUCED AND ENTRAPPED IN POCKETS WHERE EACH SPRING POSSESSES DIFFERENT STIFFNESS LEVELS

The invention described here refers to a method for producing innerspring units(4) for mattresses from springs which are pocketed in woven or non-woven material, as shown in Figure 1. The innerspring unit is made up of springs which are parallel to each other and with their longitudinal axes perpendicular to the plane of the mattress. The density of the springs' windings changes along the length of the spring, thus affecting the stiffness of the spring.

The woven or non-woven material (Figures 2 and 3), is shaped such that there are continuous rows of pockets (10), between which there are connections (11) and into which (10) the springs are placed (1). The springs (1) are trapped within the pockets (10) by means of connection (13), as shown in Figure 10. This way, strings of springs (3) are formed, which are connected to each other at the middle of the pockets by means of connections (12), thus forming the innerspring unit of Figure 1.

The innerspring unit is formed by cutting strings of springs to a length equal to the one dimension of the innerspring unit and attaching them to each other, parallel to one another, until the second dimension of the unit is achieved.

The method described here describes one way of producing this type of innerspring units, which, when compared to the existing methods is more efficient, more economic, and compacts in one machine the various stages of innerspring unit production.

The usual method for producing innerspring units from pocketed springs is the serial production of springs and the serial entrapment of the springs in pocket strings of great length. In turn, these strings are fed to another machine, where they are cut to the desired length and are attached to each other in order for the innerspring unit to be formed.

Patents WO 0198151, WO 9950175, EP 1192884 A, EP 0967031 A2 and WO 9925647 describe methods and machines for the production of springs, which are entrapped in strings of woven or non-woven material. In all cases, the springs are produced one by one and are placed in a long strip of woven or non-woven material. This strip is folded and its surfaces are attached to each other in such a way as to form pockets. This process produces a long, continuous string of springs. In some cases, the springs are heat treated and in some not.

The string of springs that has been produced through the process described above must be used subsequently in the construction of innerspring units. The traditional method for producing these units is manual assembly. According to this method, the strings are cut to the desired length, are positioned next to each other and are held to each other by means of strings which run the length of the unit's one dimension at approximately half height of the spring.

Automatic methods and machines have been described in inventions DE 4303089, EP 0624545, WO 9737569, WO 9737569, EP 0764608 BI, EP 0155158 A2 and WO 0055088.

The principle on which they are based is summarized in the following procedure: 1. A new string of springs is cut to the desired length. 2. Hot melt glue is deposited on the new or the previous string of springs. 3. The new string is pressed against the

segment of the innerspring unit that has been constructed in order to adhere to it and become a part of it. There are variations to the procedure described above, the more interesting of which describes a method according to which the springs are not glued to each other, but their upper and lower surfaces are glued to a sheet of woven or non-woven material. This sheet also maintains the dimensions of the unit.

The invention presented in WO 9932396 is the most innovative and productive one. Both of these characteristics are attributed to the fact that the springs are entrapped in woven or non-woven material at the same time the innerspring unit is produced. This way, all springs of a row are advanced simultaneously into the pockets of the woven or non-woven material, and the pockets are attached to each other.

The disadvantage of all of the above-mentioned methods is that their productivity is limited by the fact that the springs are produced by a single spring machine. Even according to the most recent invention (WO 9932396) where there is a significant gain from the simultaneous production of innerspring unit and string of springs, the whole process is limited by the production rate of the one and only spring machine.

The method described here overcomes this problem, as indicated below.

The intent of this invention is to describe a method for the manufacturing of innerspring units, which embodies in a single machine the production of springs and their assembly into an innerspring unit which will also behave like two or more independent innerspring units. This method offers flexibility in the change of spring type and increased production rate in producing the final product compared to previous methods. Furthermore, the final product (mattress or pillow) is divided in segments of different stiffness thanks to the multiple stiffness springs.

A possible, but not restricting embodiment of this method is described in the attached Figures.

Figure 1:	Typical innerspring unit made of springs entrapped in woven or non woven material.
Figure 2:	Continuous, pre-constructed pockets before entry of the springs (Figure 2a), and pockets with springs (Figure 2b).
Figure 3:	Strings of pockets which are connected to each other, thus making up the flexible part of the innerspring unit. They are ready to receive the springs, one row at a time.
Figure 4:	The procedure of simultaneous spring production and their entrapment in a string of pockets.
Figure 5:	The process of spring production and their entrapment in pockets which are attached to each other in two dimensions.
Figure 6:	Parallel translation of all springs to assembly.
Figure 7:	Rotation and translation of all springs to assembly.
Figure 8:	Spring windings which are selectively compressed and attached to the sides of the pocket.
Figure 9:	Layers of different stiffness within a mattress.
Figure 10:	Production of pocket string at the point of spring insertion.
Figure 11:	Spring within a pocket, with its end windings attached to the pocket.
Figure 12:	Entrapment of the springs within the pockets. Initially, the springs are placed on the flexible material, and then the flexible material is folded and sealed.
Figure 13:	Method for attaching selected spring windings to the sides of the pockets.

This invention includes the following innovative applications:

1. For every row of springs, a separate spring machine corresponds to every pocket, that is, approximately 35 spring machines.

These machines work simultaneously and have a common power source, that is, a common mechanism for the formation of the spring's shape, the number of windings and the pitch.

They also have a common source for pulling and cutting the wire, and for heat treating the springs. Even the transportation of the springs for inserting into the pockets is done simultaneously by mechanisms with common power source.

Transportation of the springs from the point of production (spring machines) to the point of insertion into the pockets can be done by one of the following methods.

A) The springs can be transported through translation, as indicated in Figure 4.
B) The springs can be transported along a straight line (Figure 6), where all springs are moved at the same time to the position of heat treatment, if necessary, and then all springs are moved simultaneously to the position of assembly.
C) The springs are moved and rotated at the same time form one processing position to the next, as indicated by Figure 7.

The simultaneous production of all springs for the completion of an innerspring unit row can be replaced by a partial production, or a serial production, however, the principle of massive production remains.

That is, six or more spring machines may be producing springs for part of a row, but all springs of a row will enter the respective pockets simultaneously.

2. Every spring machine has the capability to produce springs of different stiffness.

This way, there can be transverse rows of springs with the desired stiffness.

3. The rows (Figure 2) of flexible material (3) pockets (10) in this invention are produced and used in three different ways. These methods are necessary because they serve the massive entrance of the springs into the pockets.

A. The first method

Continuous rows of pockets are prepared, in such a manner as to have their three sides closed and the fourth side open, so that the spring can enter. This flexible strip of material is advanced to the assembly mechanism, as Figure 4 indicates. At the assembly point, a mechanism, common to all pockets, keeps the pocket openings open for all springs to enter simultaneously. After the springs enter the pockets all openings are sealed simultaneously in order to entrap the springs.

These pockets are advanced and the next set of pockets is positioned at the assembly point, so that the same process can be repeated.

This way, a row of springs is produced, which can then be cut to the desired length. The cut rows of springs are then connected together to form the innerspring unit.

B. The second method

The rows of pre-fabricated pockets are also attached to each other at points (12) in order to constitute the basic structure of the whole innerspring unit, as indicated by Figure 3. This way, when the springs are inserted into the pockets and are entrapped, the innerspring unit is complete and no further processing for connecting rows is required.

Attaching the rows to each other is even easier when the pockets don't contain springs.

The construction of innerspring units with this method is illustrated in Figure 5, and is carried out, in the following manner:

The first row of pockets enters the assembly location.

The pockets' lips are held open with the appropriate mechanism and the springs are inserted into the pockets massively.

In turn, the springs are compressed inside the pockets and the pockets' openings are sealed together (13), with a single source of power.

The row of pockets with the entrapped springs is translated in the direction of the row's width and the next row of empty pockets is advanced to the assembly location.

The innerspring units that have been assembled with this method can contain transverse rows of springs with different stiffness. This is accomplished as follows:

First of all, all rows of an innerspring unit have the same number of pockets.

Every pocket of a row corresponds to a different spring machine, which produces springs only for its respective pocket.

Given that we can produce springs of different stiffness on each machine, we can insert springs of the same stiffness into the pockets of different rows, at the same location along the length of a row.

Since the rows of an innerspring unit's pockets are filled with springs sequentially, the columns will contain springs of the same stiffness.

The rows of springs are oriented along the length of the mattress, while the zones of different stiffness are formed along the width of the mattress, in order to serve the various physical needs of the human body.

C. The third method

The row does not contain any pre-fabricated pockets, but is made up of flexible strips of material.

The springs are placed on top of these strips (22), along their length, and on half of their width, parallel to each other, and in the same distance between them, as shown in Figure 12a.

In turn, the free half of the flexible material is folded in such a way as to cover the springs, as illustrated by figure 12b.

A system for connecting the flexible material (21) enters then simultaneously between the springs and forms the transverse attachments between the two folds of the flexible material, thus forming the pockets, which already contain the springs.

Finally, the springs are compressed inside the pockets, and the openings of the pockets (9) are sealed.

The row of pockets/springs that has thus been formed is advanced, pulling the next segment of flexible material to the assembly location. The same process is repeated, and a long row of springs is formed.

A variation of the above method is the method shown in Figure 10. According to this method, the pockets are formed one step before the insertion of the springs, as follows: Dies (20) having approximately the shape of the spring enter the one half of the strip. The sealing system (21) folds the flexible material and seals on either side of each die. The pockets thus formed are advanced to the assembly station.

4. An important application of this invention that simplifies the construction of quality mattresses and yields a new product is the following:

After inserting a spring into a pocket, selected successive windings of the spring (27) and compressed by a suitable mechanism, towards the bottom of the pocket, as shown in Figure 8.

In turn, the winding that compresses the previous windings and is further away from the bottom of the pocket is fastened at that height to the pocket (28). The fastening here can take place in many ways.

This way, the first compressed windings have a greater compression than the rest of the windings and are used as a box spring, which they replace.

Then, the next group of the same spring's windings (26) are compressed, on top of the previous windings, and use as bottom point 28.

When they are at the required compression level, usually smaller than that of the previous group of windings, the top winding of this group (26) is fastened to the pocket at point (29). This way, the main body of the innerspring unit is formed. Group 25 is formed in the same manner and is fastened to point (30) or is entrapped when the pocket is sealed (13).

Consequently, with one type of spring, initially uniform, and a single innerspring unit, we form more than one different stiffnesses, in levels (31, 32, 33) within the same innerspring unit, as shown in Figure 9. These levels correspond to and replace respective segments of a bed which are normally separate and are placed on top of each other in order to form the bed. With this method, the result is the same as having a box spring, a mattress and a top mattress.

The fastening of the windings to the sides of the pockets may be achieved with a group of staplers that use metal staples.

In this case, the flexible material of the pockets is pressed from the outside to the inside, as Figure 13 shows, at points (41), that is, left and right, very close to the winding, so that it encloses (42) the spring wire. At this point, connection (43) is activated. The metal stapler connects steadily the two sides of the cloth thus entrapping the spring wire.

With this method, a winding can be fastened in two or more positions on the periphery of the spring and can function a base for the compression of the windings above it and as a top of the windings compressed below it.

This is repeated for the other groups of windings until the last winding is entrapped by the opening of the pocket, which is sealed.

The levels of stiffness that can be formed with one spring are more than one.

The function of this innerspring unit is the following:

At first, the weight of the person lying on the mattress compresses the windings of the first level (top mattress). When these windings reach the level of compression of the second group, the first and the second group of windings move together (are compressed simultaneously). When the first and second group of windings reach the degree of compression of the third group (box spring) all windings more together, like one spring.

The formation of pockets of increasing stiffness may be reverse. That is, we can form the smallest compression at the bottom of the pocket and the greatest at the top.

5. An application of this method is to fasten the top winding of the spring to the opening of the pocket, without sealing the pocket.

This way, the springs is entrapped and the opening of the pocket is open. This helps the ventilation of the innerspring unit.

This can be done on both ends of the pocket, if when constructing the pocket both ends are left open and the end winds of the springs are attached to the top and bottom lips of the pockets. Then ventilation is even better.

CLAIMS

1. Method for the production of innerspring units from springs which are entrapped in pockets (10) of flexible material, which pockets are attached to each other, forming rows (3), which rows can also be attached to each other beforehand, thus forming innerspring units which have layers parallel to the wide surface of the innerspring unit, each layer with a different stiffness, characterized by the fact that all springs of a row are produced simultaneously by a number of spring machines (6) which number is the same as the number of springs in a row, which spring machines can produce springs of the same or different diameters, can have a common source of power for their simultaneous or partial operation, the produced springs for the whole row are advanced and inserted simultaneously into the respective pockets (10) of the rows (3) of flexible material, where the pockets can be pre-fabricated, where with the appropriate mechanism certain intermediate windings of each spring, after a compression that will create the desired stiffness, can be fastened (28) to the inside of the pocket, afterwards, by sealing the opening of the pockets (13), the springs are entrapped, thus forming a continuous row, or several rows when they are attached to each other beforehand (2), thus forming the innerspring unit.

2. The method for producing innerspring units according to claim 1, which is characterized by the fact that every spring machine that produces springs for a transverse row of the unit can produce springs of the same of different stiffness with respect to the other springs of the row (3) by using a different diameter wire, or by producing springs of a different diameter.

3. Method for producing innerspring units according to claim 1, which is characterized by the fact that the springs (1) are produced by a number of spring machines (6) equal to the number of springs necessary for the formation of one side of the innerspring unit or at least more than 6 springs machines, where the springs are produced simultaneously and their insertion into their corresponding successive pockets is done simultaneously also.

4. Method for producing innerspring units according to claim 1, which is characterized by the fact that one or more intermediate windings of the springs inserted in the pockets can be compressed (27) to a desired height by a special mechanism towards the bottom of the pocket and at that point the windings are fastened (28) to the side of the pocket (10) by an appropriate method, thus entrapping the previous windings in order to acquire the desired compression for the formation of the first layer of the mattress's stiffness (31), which will function as a box spring, the same can be repeated with other selectable intermediate windings (26), which after compressing other intermediate windings on top of the first fastened intermediate winding are also fastened (29) to the sides of the pocket thus forming a second layer of stiffness which can function as the main innerspring unit (32) by using a single spring which participates with a different density of windings in the different stiffness layers, where the same can happen with the top winding (25) of the spring thus forming the next stiffness layer, which can function as the top mattress (33).

5. Method for producing innerspring units according to claims 1 and 4, which is characterized by the fact that the entrapment of the intermediate windings of a row of springs (25, 26, 27) or part of the row of springs may be different

than the adjacent rows of springs in order to form the desirable stiffness conditions at the different parts of the mattress.

6. Method for producing innerspring units according to claims 1, 4, and 5, which is characterized by the fact that the one or both end windings of the spring inserted in a pocket are not entrapped by sealing the pocket lips, but are fastened to the periphery (40) of the pocket edges-lips so that the pocket remains open at the respective end, thus facilitating mattress ventilation and at the same time ensure spring pre-tension.

7. Method for producing innerspring units according to claims 1, 4, and 5 which is characterized by the fact that the formation of different stiffness layers with the same spring can be done after entrapping the spring in a pocket by an external operation for the compression of the windings and their fastening on the sides (25,26, 27) of the pocket's flexible material.

8. Method for producing innerspring units according to claim 1, which is characterized by the fact that the massively produced springs are placed along a strip (22) of flexible material, being held in constant distances between each other where they are compressed subsequently and the layers of the flexible material are attached to each other between the springs, thus forming the respective pockets and, at the same time, entrapping the whole row of springs, where by compressing the springs into the pockets (10) the sealing of the pockets' lips (13) is also performed.

9. Method for producing innerspring units according to claim 1, which is characterized by the fact that the massively produced springs are placed into a row of pockets, the pockets of which are formed in the stage which precedes spring insertion, by folding a strip of flexible material (22) around dies (20), which pockets have approximately the shape of the springs, and by welding on both sides of each die, by means of the appropriate mechanisms (21).

10. Method for producing innerspring units according to claim 1, which is characterized by the fact that the necessary rows of flexible material have pre-fabricated pockets (2) and the rows are attached to each other in order to form the whole basic structure of the innerspring unit in the required dimensions, the construction of the innerspring unit is accomplished by inserting into all pockets of a row the respective number of the massively produced springs, by translating the rows of pockets parallel to each other in the sense of their width in order for the next empty row to be advanced the pockets of which are prepared by being opened in order to receive the springs which are entrapped, the construction of the innerspring unit is completed.

11. System for the fastening of a spring's windings to the sides of the pocket (28, 29, 30) of flexible material which surrounds the spring and for the welding of the sides of the flexible material to each other for the formation of pockets, characterized by the fact that we use a system of fastening mechanisms-staplers which use wire staples as fastening means where these mechanisms are at least the same in number as the simultaneously processed springs and pockets, weld the two sides of the flexible material for the formation of pockets and fasten securely the flexible material around the wire of the windings thus securing the windings at the desired height, operating from the

outside of the pocket, finally, staple the edges of the pockets to each other (13) in order to entrap the springs.

12. Innerspring unit made of pocketed springs, which unit as more than one layers (31, 32, 33) of different stiffness, characterized by the fact that the different stiffness layers are formed by a single layer of springs (1), the stiffness layers are accomplished by compressing part of each spring's windings and fastening them to this particular position by attaching them (28) to the sides of the pocket and by repeating the same method for the formation of the second or more stiffness layers by means of the same spring thus forming the conditions that exist when three mattresses are used as box spring, mattress, and top mattress.

ABSTRACT

METHOD FOR THE CONSTRUCTION OF INNERSPRING UNITS FROM SPRINGS WHICH ARE MASSIVELY PRODUCED AND ENTRAPPED IN POCKETS WHERE EACH SPRING POSSESSES DIFFERENT STIFFNESS LEVELS

This invention refers to a method for the production of innerspring units from springs pocketed in woven or non-woven. This method requires the employment of multiple spring-producing machines for the simultaneous production of all of the springs that belong to a row of the innerspring unit. The same machine integrates spring production and pocketing of the springs in woven or non-woven. The innerspring unit is made up of springs which are positioned parallel to each other, with their longitudinal axes perpendicular to the plane of the mattress. One characteristic of these springs is that their stiffness is not constant throughout the length of their longitudinal axis. The density of the windings is varied through the length of the spring's longitudinal axis, thus affecting spring stiffness.

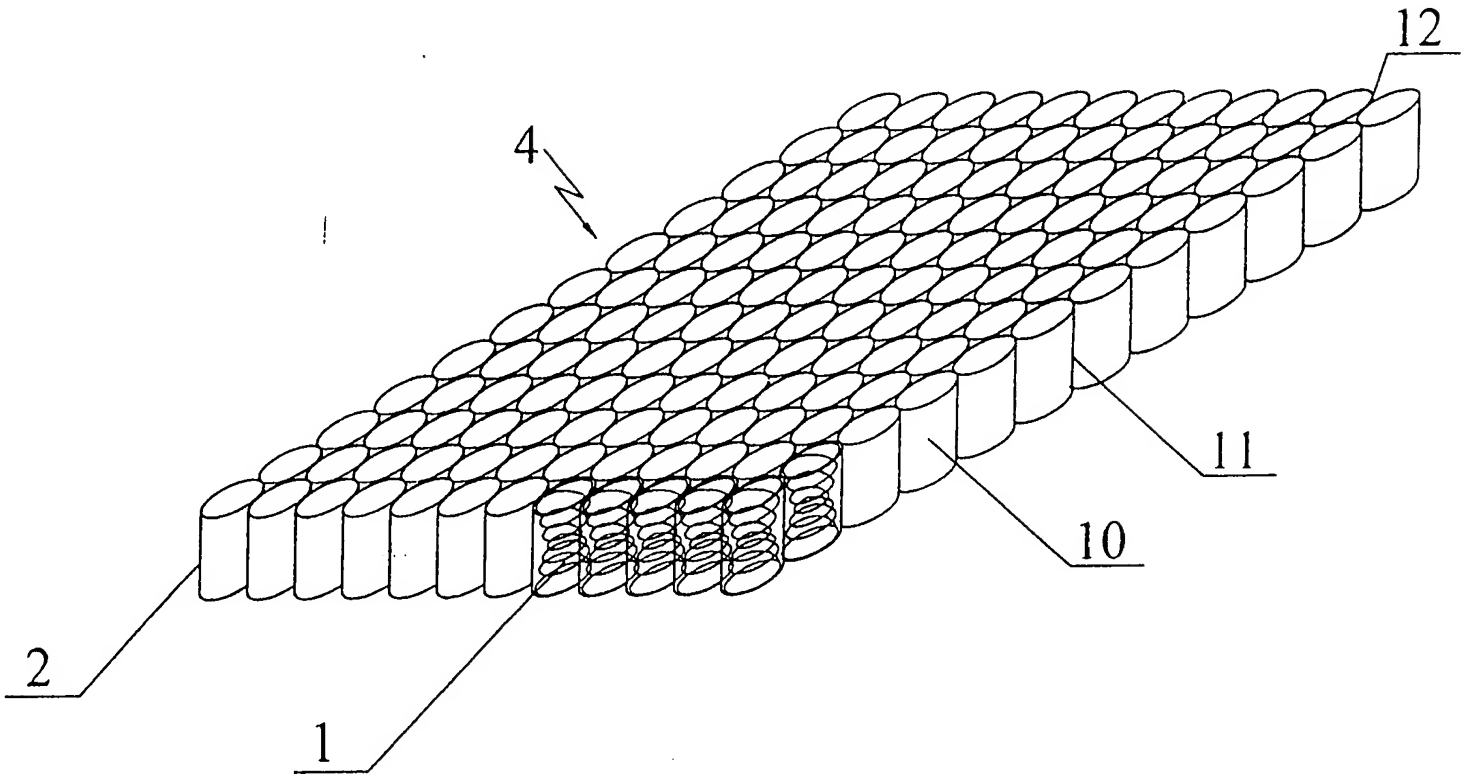

FIGURE 1

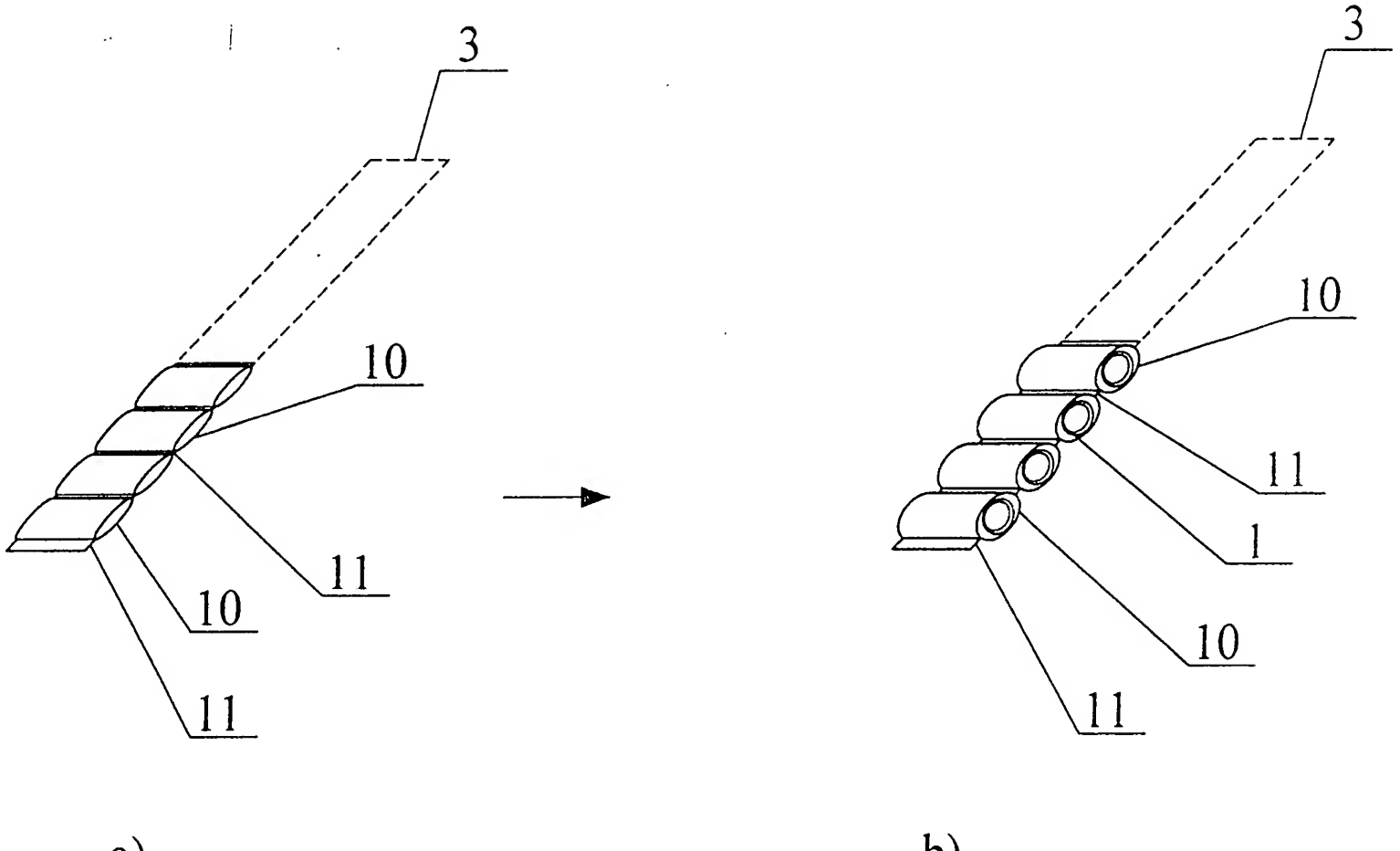

FIGURE 2

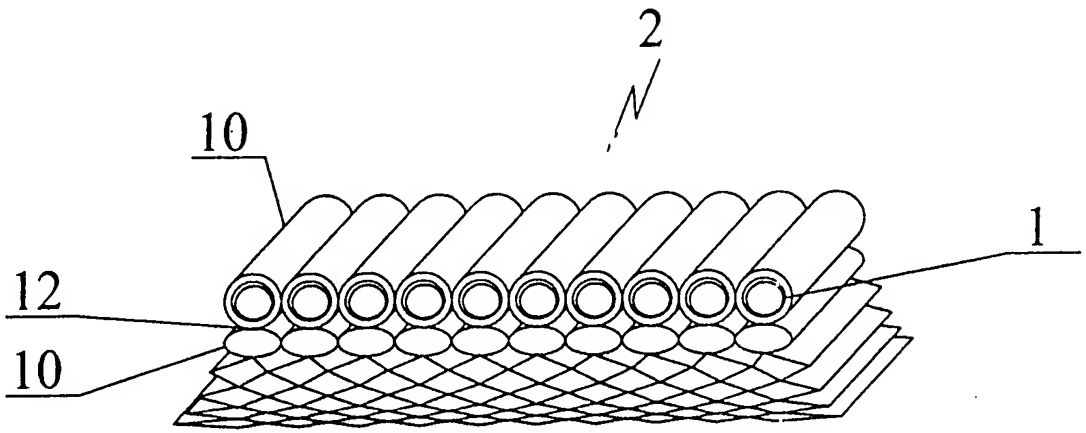

FIGURE 3

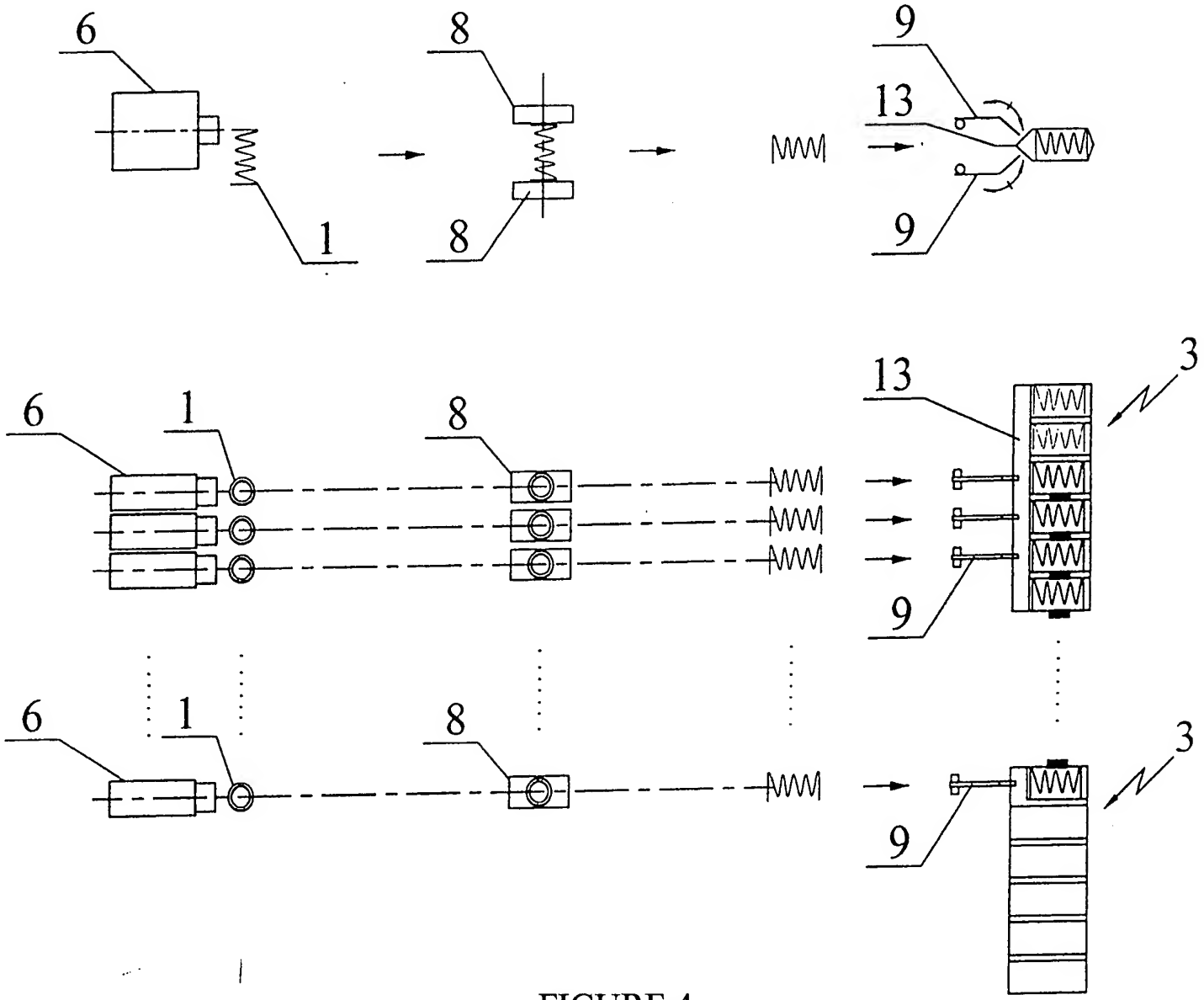

FIGURE 4

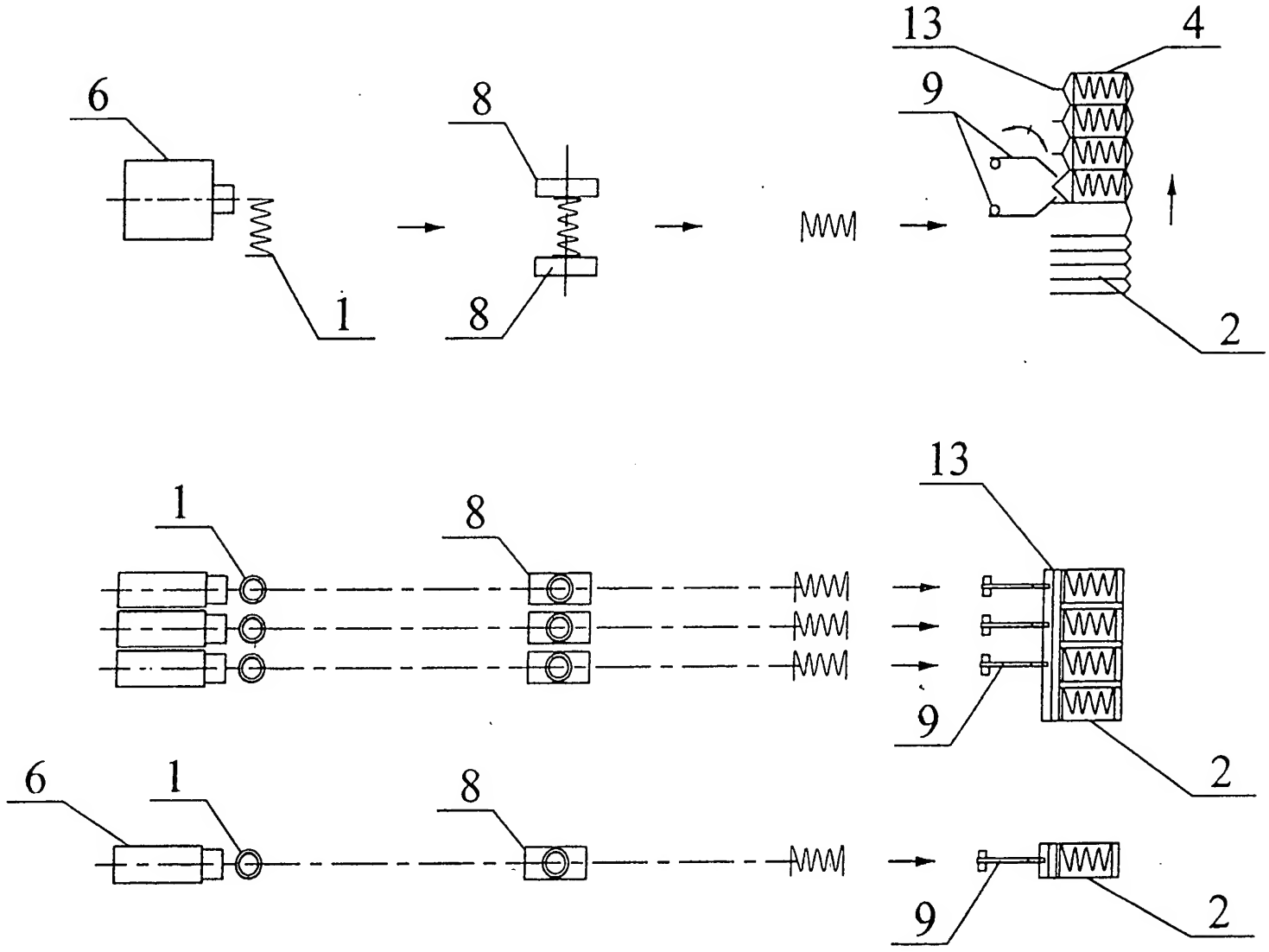

FIGURE 5

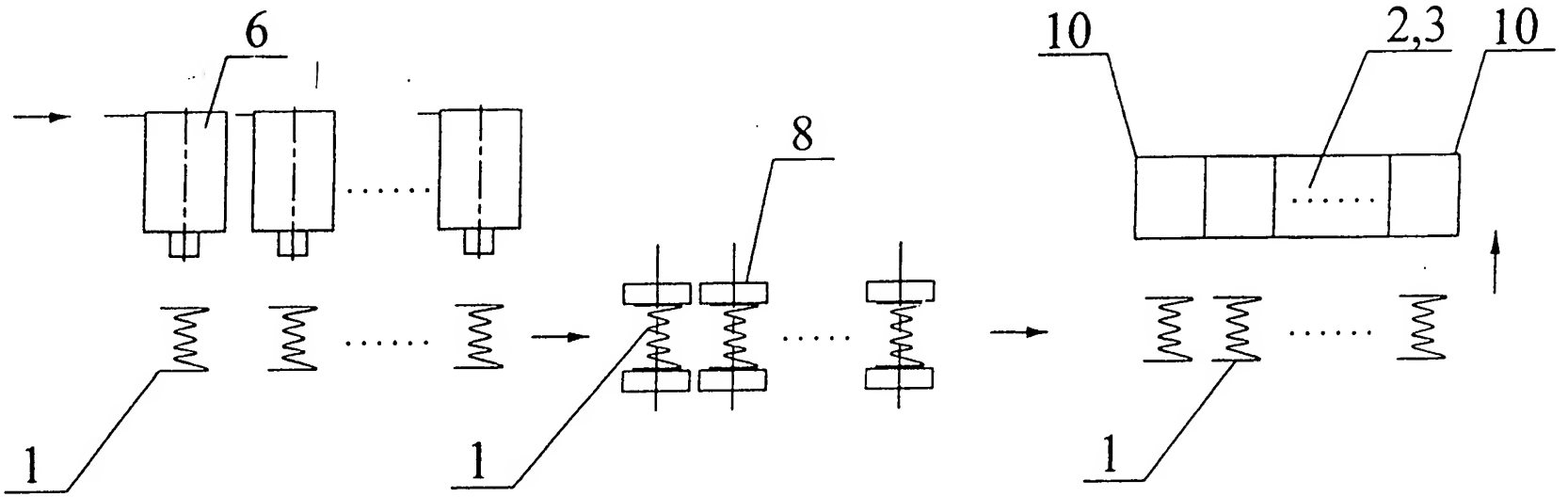

FIGURE 6

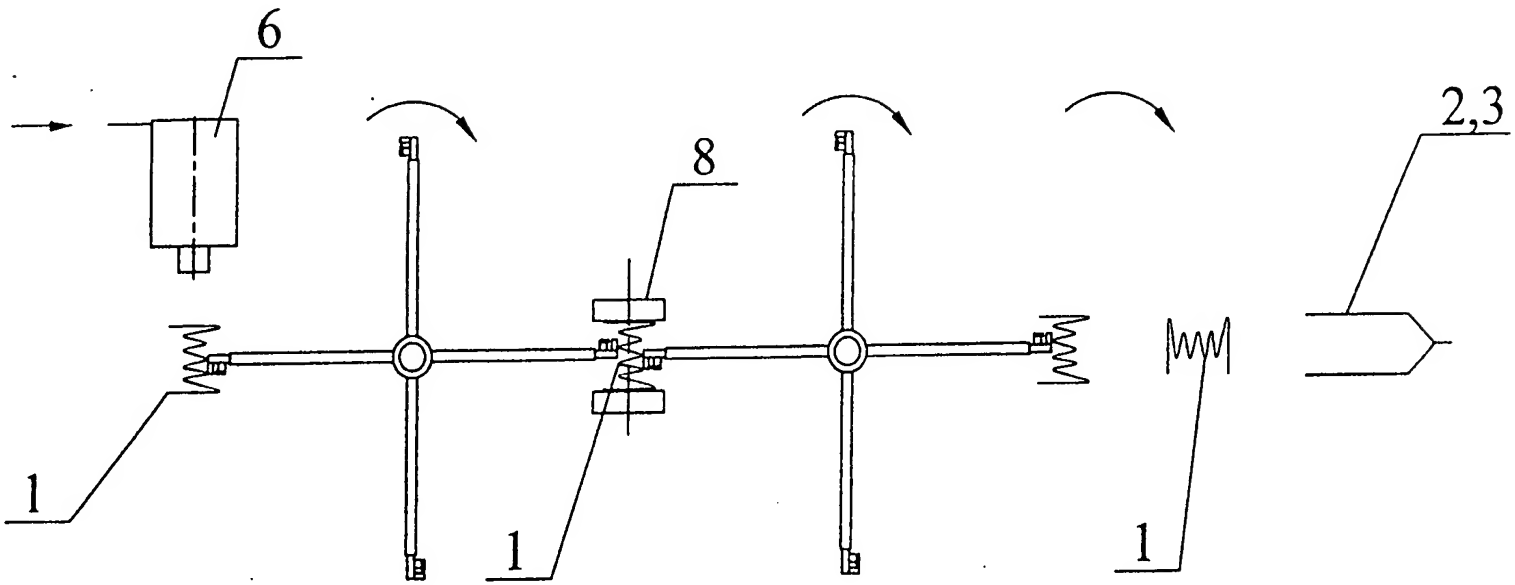

FIGURE 7

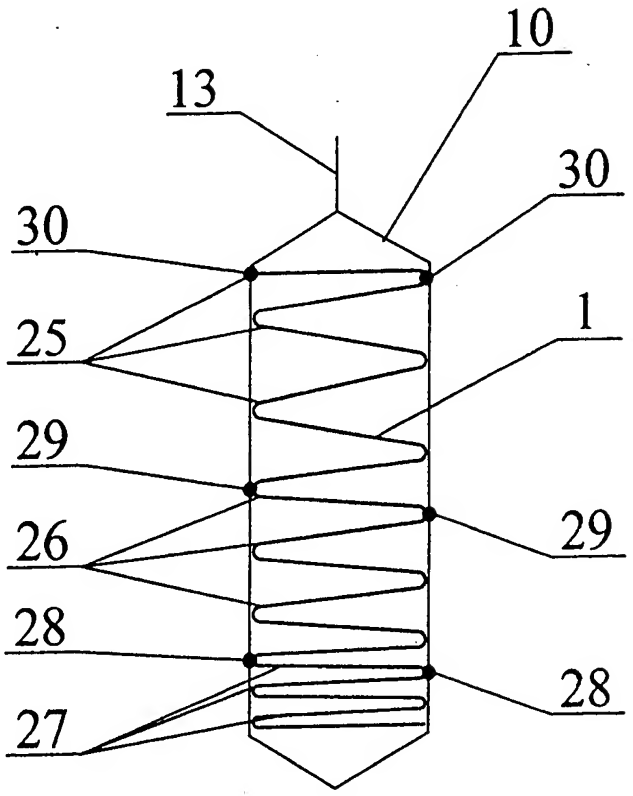

FIGURE 8

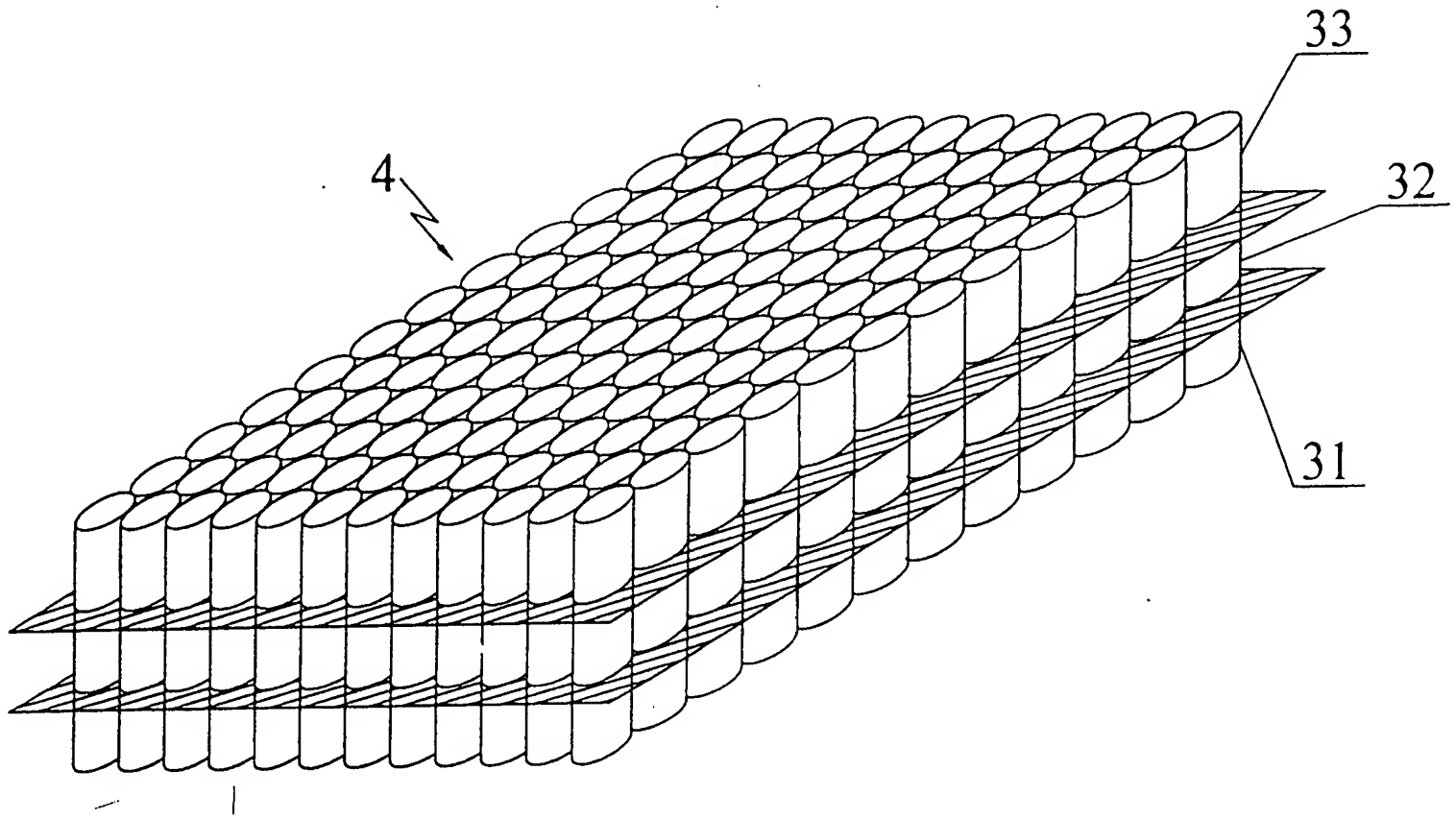

FIGURE 9

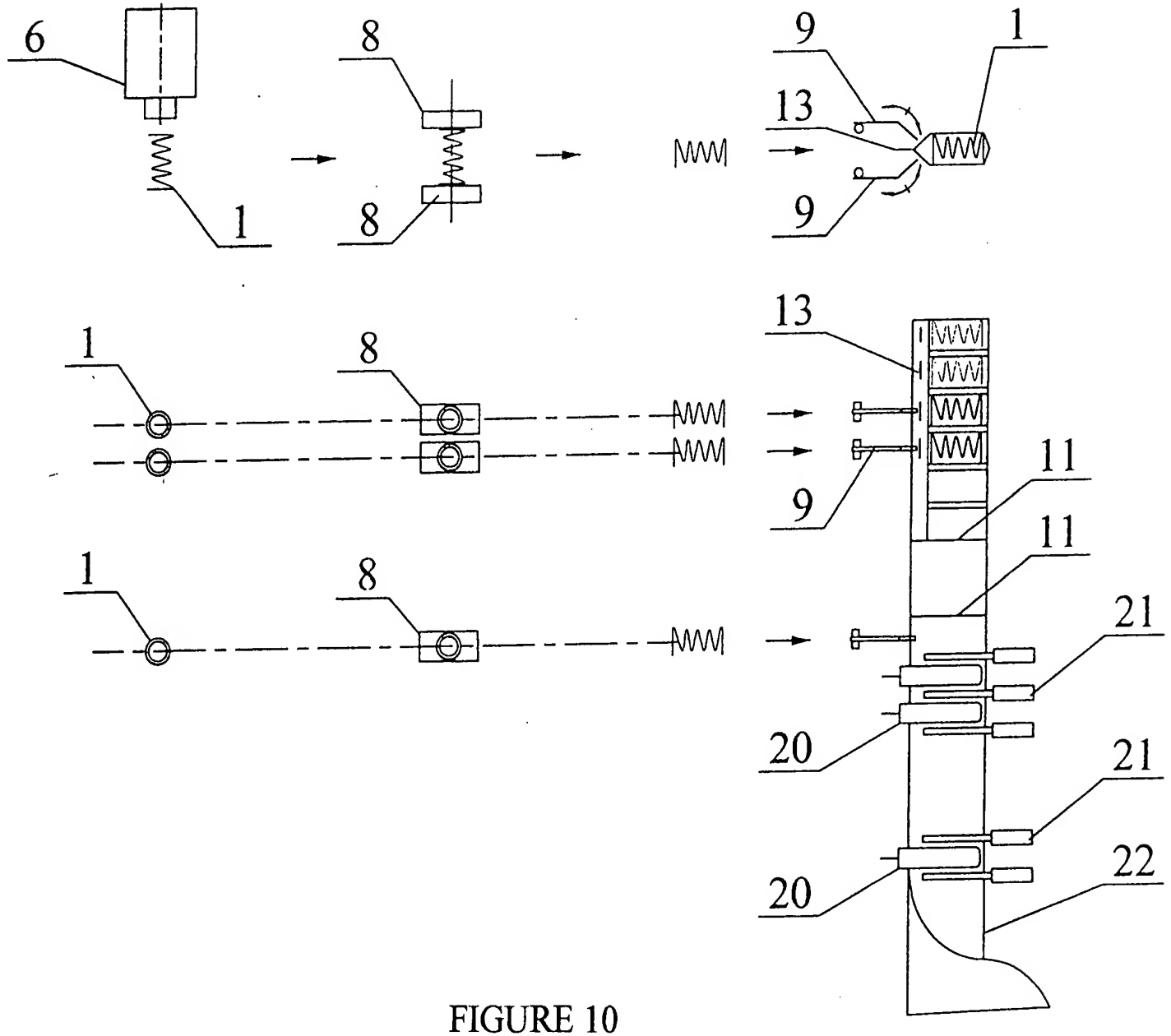

FIGURE 10

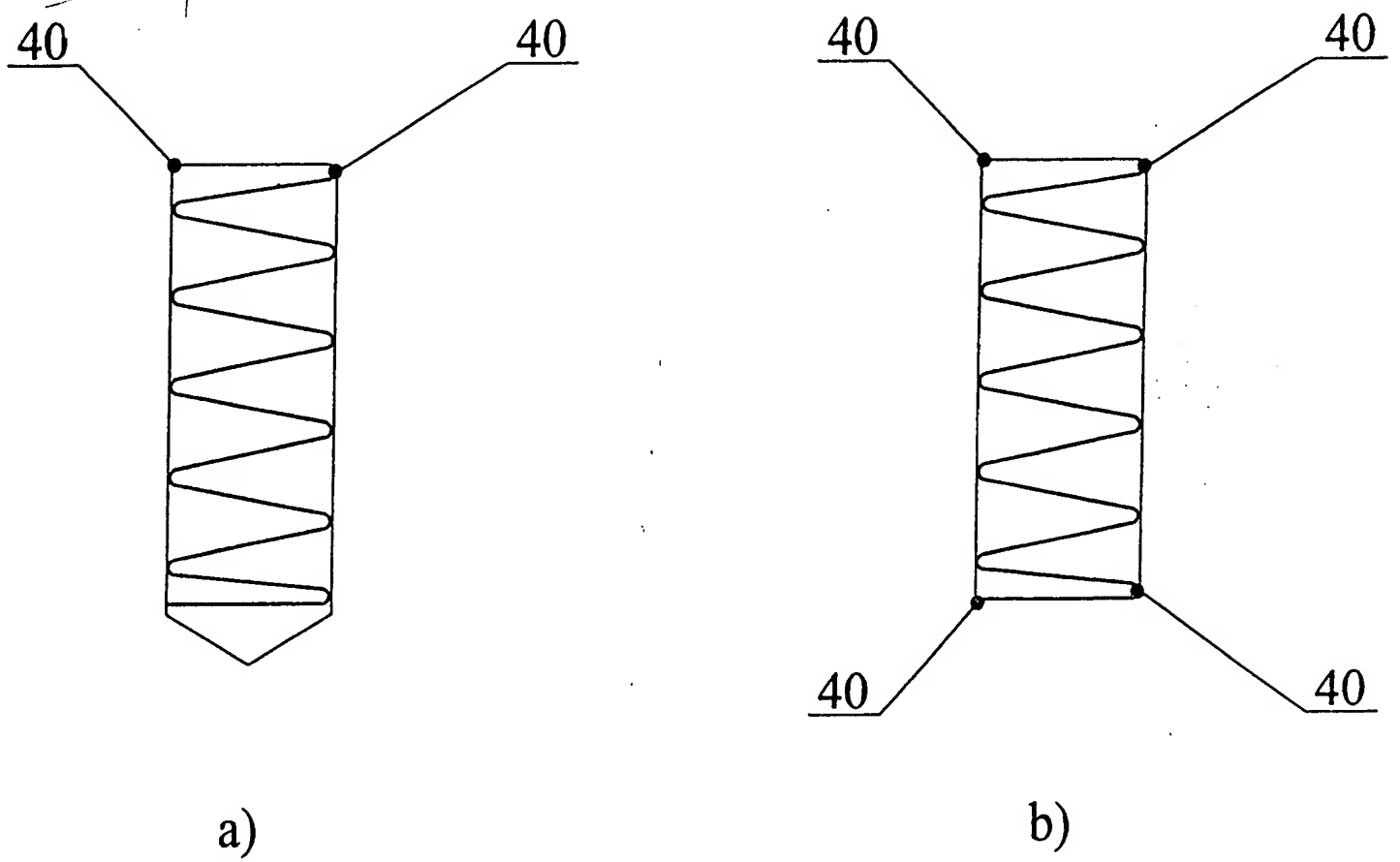

FIGURE 11

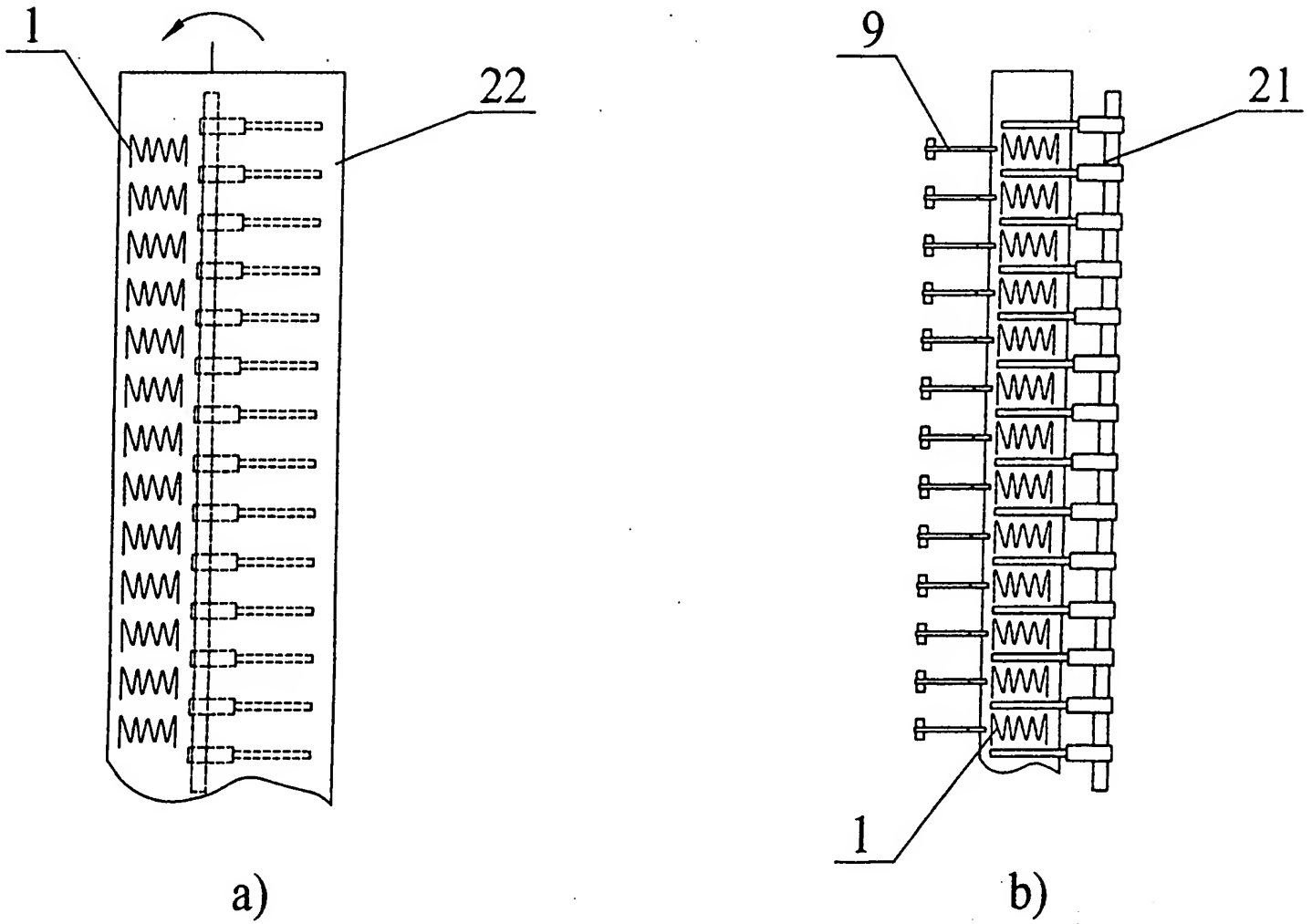

FIGURE 12

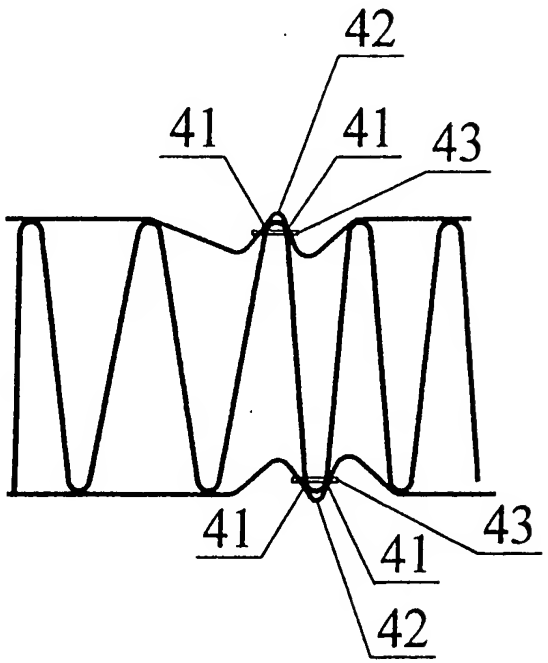

FIGURE 13